Regional Information Report 3A15-04

Salmon Age, Sex, and Length (ASL) Sampling Procedures for the Arctic-Yukon-Kuskokwim Region

by

Shane M. Eaton

July 2015

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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The Regional Information Report Series was established in 1987 and was redefined in 2007 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as area management plans, budgetary information, staff comments and opinions to Alaska Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at: http://www.adfg.alaska.gov/sf/publications/

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ABSTRACT

Age, sex, and length (ASL) data are collected from thousands of Chinook *Oncorhynchus tshawytscha*, summer chum *O. keta*, fall chum *O. keta*, sockeye *O. nerka* and coho salmon *O. kisutch* in the Arctic-Yukon-Kuskokwim (AYK) Region every year. ASL data are obtained from commercial and subsistence harvests, as well as escapement and test fishery projects. This manual describes procedures recommended by the Alaska Department of Fish and Game, Division of Commercial Fisheries for sampling salmon in the AYK Region. Project leaders and sampling crews will find this manual useful for collecting scales (age data) and completing data entry templates.

Key words Chinook *Oncorhynchus tshawytscha*, summer chum *O. keta*, fall chum *O. keta*, sockeye *O. nerka* and coho salmon *O. kisutch*, age, sex, length ASL, sampling.

INTRODUCTION

This document provides general directions for sampling salmon for age, sex, and length (ASL) data. These data are an essential component of salmon management and research in the Arctic-Yukon-Kuskokwim (AYK) Region. It is the responsibility of everyone involved with ASL data collection to ensure the highest quality standards are followed. To be useful, data collected must be neatly and accurately recorded on field data forms and scale gum cards, scales neatly and correctly mounted on scale gum cards, gum cards handled properly, and data entered into electronic files without error. The procedures described in the following instructions are to be adhered to for all age, sex, and length sampling of salmon in the AYK Region. Any project specific questions should be directed to the project leader. Data collection methods can vary by region, and therefore it is important to be familiar with this document and the methods used in the AYK Region. For similar methods used by Department of Fisheries and Oceans Canada refer to MacLellan 2004[1].

OBJECTIVES

The objective of this report is to provide instruction in proper collection and handling of salmon age, sex, and length data.

SAMPLING PROCEDURES

HANDLING THE FISH

When handling commercial, subsistence, and test fishery harvests, remember these fish are a food product of considerable value to the owners and as such should be treated carefully to avoid bruising or damaging skin or flesh, even if the owners aren't careful. DO NOT LIFT FISH BY THE TAIL without supporting the rest of the body to avoid injury to the backbone. This breaks blood vessels along the spine and significantly lowers product quality. Handling live fish at weirs, counting towers, and other escapement projects can be difficult. Remember that these fish need particularly gentle handling; keep the fish in the water as much as possible, if lifting the fish out of the water support the whole body, and keep handling time as short as possible.

[1] MacLellan, S. E. 2004. Guide for sampling structures used in age determination of Pacific Salmon. Department of Fisheries and Oceans Canada, Stock Assessment Division, Pacific Biological Station, Nanaimo, British Columbia.

IDENTIFICATION TO SPECIES

Many Alaska salmon species look alike at different stages of maturity and it is common to have multiple species returning to spawn at the same time. Therefore it is important to examine and identify the species of each sampled fish carefully. If unsure of identifying characteristics consult the project leader, AYK stock biology staff, or refer to Figure 1.

SEX IDENTIFICATION

Techniques for identifying the sex of salmon depend on the sampling project type. Commercial harvests, test fisheries, and many escapement projects that sample dead fish can use internal sexing methods, by slitting open the belly of each fish and examining the sexual organs. Females will have pink or red ripening eggs held along the spine in the dorsal section of the body cavity or loose in the body cavity. Males will have white testes held in the same location in the body cavity as the eggs. This internal sexing method is preferred as it is 100% accurate if done correctly. Some commercial or subsistence harvest sampling may rely on external methods if the processor or owner does not wish their fish to be cut and examined. Escapement and test fishery projects involving live release of fish require external sexing techniques. External sexing can be difficult depending on the species and sexual maturity of the fish, and requires practice and attention to detail in order to be accurate. Determining the sex of salmon externally requires examining the vent on the underside of the fish for the presence of an ovipositor (Figure 2), examining the head of the fish for the development of a kype (Figure 3), and examining the roundness of the fishes' belly.

LENGTH MEASUREMENTS

In the past, several fish measurement techniques have been used in the AYK Region. However, in an effort to standardize data collection region wide, measurements should be made from the middle of the eye to the fork of the tail and recorded to the nearest millimeter (Figure 4). Measurements should be taken using a rigid device, such as a meter stick or metal caliper, with the fish laying on a flat surface such as a measuring board or table, not on the curved bottom of a boat. If measuring length using a flexible tape, stretch the tape taut to get the length. Do not measure length with the flexible tape slack or along the curvature of the fishes' body.

OTHER SAMPLING PROCEDURES

Weight and Girth

Weight and girth are commonly collected in addition to ASL data from salmon; however the current sampling protocols do not require these measurements. Appendix A1 includes methods for collecting these data.

Coded Wire Tag

When sampling Chinook salmon, a clipped adipose fin is an indicator that the fish contains a coded wire tag. Currently, fish from the hatchery in Whitehorse, Yukon Territory, Canada are the only fish in the AYK Region that have coded wire tags and the adipose fin was removed. Therefore, any Chinook salmon returning to the Yukon River mainstem should be inspected for presence of an adipose fin. Appendix A2 includes information on coded wire tag sampling.

Otolith Sampling

Otoliths, also known as fish ear bones, are small bony calcium deposits located in the skull below the brain and behind the eyes. Crew members working on projects collecting salmon otoliths should refer to Appendix A3 for otolith removal illustrations. After removal, otoliths should be cleaned thoroughly, dried, and stored in individually labeled containers.

FILLING OUT THE SCALE CARD

It is very important to label the scale gum card properly; this simple task ensures age data from the scales can be paired with the recorded sex and length data. This is one of the simplest tasks, but also where many field crews err the most. Every field on the scale gum card must be completely filled out and must match the data recorded in the project field file (Figure 5). Use pencil only when filling out front side of scale gum card. It is recommended to fill out scale cards prior to sampling, as it will save time and reduce errors.

Species

Use proper names of each species of salmon (Chinook, chum, sockeye, coho, or pink), do not use common names. Common names (king, dog, red, silver, or humpy) are often regional dialect and may refer to different species depending upon location.

Scale Gum Card Number

Data collection field forms and scale gum cards should be carefully numbered to pair recorded sex and length data with collected scales (age data). Check that the number on each data collection form matches with the number in the upper right corner of the scale card. When a scale card and a data form cannot be matched by number, some of the data are not useable. Each species, gear type, and geographic location should have a separate numbering sequence. Scale gum cards from test fishery and escapement projects are numbered starting with 001 and continue sequentially throughout the season. Commercial sampling projects start a new numbering sequence (starting with 001) for each commercial fishing period.

Location

The location field can be the river, village, or point location where the fish was caught. If unsure, refer to the project leader to determine the project location. If the samples are from a project with multiple gear types or mesh sizes at a single location, note that in this field e.g., “Big Eddy Test Fishery 8.25-inch mesh drift gillnet”.

Stat code

Refer to Tables 1-3 for the correct stat code for the project’s sampling location. If the location code is missing from Tables 1-3, inquire with the AYK Regional stock biology staff for the proper stat code.

Sampling date

This is the date the fish was caught. When commercial sampling, this is the date the commercial period ended. Do not use a scale gum card for more than one day even if there is space left on a card, this will streamline data collection and eliminate possible errors.

Gear

This field is for recording the gear type that was used to catch the sampled fish. Be sure to include mesh sizes for net type gear. If using multiple mesh sizes record the sex and length data for each fish along with the mesh size used to catch that fish. Mesh size by fish number should be recorded in the remarks field.

Collector

Include the names of everyone involved in sampling, starting with the person collecting scales. This assists in training staff to collect high quality scale samples, quality scales means quality data. For subsistence harvest sampling, the name of the subsistence fisherman is listed first.

Remarks

Use this area to record any additional information relevant to the scales collected on that card (e.g., number of scales per fish, problems sampling, non-preferred scale, mesh size by fish, and scale not collected).

SCALE SAMPLING

1. As a general guideline, 3 scales are collected from Chinook and coho salmon and 1 scale from chum and sockeye salmon. Some projects with low readability of scales may need to collect more scales. Low readability typically occurs from scales collected on or near the spawning grounds where the outer margin of the scale has resorbed. When sampling under adverse conditions, e.g., rain, wind, live fish, etc., take extra care to keep the scale gum card dry and free of debris and fish slime.
2. Remove the “preferred scale” from the fish using forceps. The preferred scale is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin (Figure 6). If the preferred scale is missing, select a scale within the preferred area on either the left or right side of the fish. The preferred area is about 2 square inches above the lateral line and surrounding the preferred scale. If no scales are present in the preferred area on either the left or right side and sufficient numbers of fish are available for sampling, disregard that fish and select another to sample. If the number of fish is limited and scales are absent in the preferred area on both sides, sample a scale as close to the preferred area as possible. This is VERY IMPORTANT as non-preferred scales have different patterns than scales from the preferred area and can lead to inaccurate ageing.
3. Remove all slime, grit, and skin from the scale by moistening and rubbing between thumb and forefinger. Moisten the CLEAN scale and mount it on the scale gum card directly on top of the number “1” (Figure 7). The easiest way to moisten a clean scale is to lick it (if the scales are not moistened properly they will fall off the cards after the first pressing or sooner). IMPORTANT: the side of the scale facing up on the scale gum card should be the same as the side facing up when it was on the fish. This outward facing side is referred to as the sculptured side of the scale, and the ridges on that side can be felt with a fingernail or forceps. There are no ridges on the other side of the scale and an

inverted scale cannot be aged. All scales should be mounted in the same orientation; meaning the section of scale that was towards the head of the fish should be towards the top of the scale gum card.

4. When sampling 1 scale per fish, scales from up to 40 fish can be mounted on each scale gum card (Figure 7).
5. When taking 3 scales per fish, remove the preferred scale, scale #2, and scale #3 (Figure 7). Scale #2 is 1 inch to the left (towards the head), and scale #3 is 1 inch to the right (towards the tail) of the preferred scale. All scales are 2 rows above the lateral line. Up to ten fish can be mounted on the same scale gum card. Mount all three scales from fish #1 over the numerals "1", "11", and "21" on the scale gum card (Figure 7). Continuing, mount the three scales from fish #2 over the numerals "2", "12", and "22", and so on …

Inspecting the selected scales is very important. Scales not inspected for quality are often unreadable and therefore useless. Review Figures 8-9 for examples of common scale selection errors and suggested solutions. These errors can be minimized by carefully inspecting and handling each selected scale.

HANDLING THE COMPLETED SCALE CARD

Allow completed scale gum cards to dry fully then cover the gum side of the card with wax paper. Avoid squeezing the two layers together while the scale gum card is wet because the glue tends to ooze over and fills in the depressions on the sculpted side of the scale. If this happens, it is impossible to make a clear scale impression and the scales cannot be aged. If a card becomes too wet, the scales do not adhere and it is best to remount all the scales onto another card. DO NOT use anything other than high quality wax paper between scale gum cards as poor quality waxed papers strongly adhere to even slightly moist scale gum cards.

After the cards are completely filled out, are dry and have wax paper between each one, place all cards into a clean plastic bag and store them so they remain flat (such as under a light book). Send these completed cards to AYK stock biology staff as directed in-season or as soon as possible following the end of the field season (Appendix A4).

FIELD FILE DATA ENTRY PROCEDURES

The electronic field file is a MS Excel template made by the AYK stock biology staff at the beginning of each season for each project (set up instructions can be reviewed in Appendix A5). The first worksheet (labeled "Project Level Data") of the field file is to be set up with attributes of the project. This sheet also holds information for separate aspects of the project (such as separate species, gear types, or locations sampled) corresponding to the fish level data entry worksheets (labeled A through F).

Review the information on the "Project Level Data" worksheet. If corrections need to be made contact AYK stock biology staff. If the information on the project level data worksheet is correct continue with data entry on the "data entry worksheets". Clicking on the "go to data sheet" buttons will open the workbook to the corresponding worksheet for data entry.

Sample Date

This column is required for every fish sampled. This is the date the fish was caught, or the date the commercial fishing period ended.

Scale Gum Card Number

This number should match the number on the scale gum card. If you are sampling chum or sockeye salmon, 1 scale per fish, there can be up to 40 fish with the same scale gum card number, for Chinook and coho salmon, 3 scales per fish, there can be up to 10 fish per card.

Fish Number

This number should reflect the position of the scale on the scale gum card. If you have 12 fish on a scale gum card, there should be fish numbers 1 through 12 entered in the data entry sheet.

Sex

Use these codes for sex: male salmon = 1, female salmon = 2, unknown sex = leave blank.

Length

Enter the recorded length to the nearest millimeter.

Weight

If the scale used to take weight measurements are in pound/ounce, enter fish weight to the decimal equivalent of the nearest ounce (Appendix A1). If weighing scale measurements are in pound/tenth, enter fish weight to the nearest 0.1 pound.

Girth

Enter the fish girth to the nearest millimeter.

Adipose Fin Clip

Currently, this only applies to Chinook sampling projects operating in the Yukon River mainstem. Enter “yes” or “no” in this field; “yes” indicates this fish was missing its adipose fin, “no” indicates this fish had an intact adipose fin. If a “yes” was recorded, enter into the fish comment field if the head was collected or not.

Mesh Size

This column is only for net gear types. Use whole numbers and decimals, do not use fractions. Refer to the reference worksheet for fraction to decimal conversion values. This column is only required if multiple mesh sizes are being used and mesh size is recorded at the individual fish level.

Commercial Period

This column only applies to commercial sampling; this is the commercial fishing period that the fish was caught.

Fish Comment

Comments apply to individual fish and are restricted to 255 characters. If more space is needed for individual fish comments type them into the blank column immediately to the right of the

data entry columns. If you want to apply a comment to a group of fish, you need to copy and paste that exact comment to all appropriate fish.

Genetic Vial Number

If collecting individual genetic samples from sampled fish, enter the genetic vial number in this field.

Auxiliary Sample Number

This field can contain different types of sample numbers such as otolith collection number, tagging number, coded wire tag sample number. Be sure to record the type of sample number in the "Fish comment" field.

Sampler

This column only applies to subsistence harvest sampling, use the full name of the subsistence fisherman.

COMMON PROBLEMS TO AVOID

- Incomplete and incorrect information on scale gum cards, field data recording forms, and entered in field file. Double check data entry in field file with field forms. Most data entry errors can be traced back to unclear handwriting and transcription errors. It is VERY IMPORTANT to write neatly and legibly on the field forms.
- Discrepancies between field file and scale gum card attributes; e.g., date, scale gum card number, fish number, number of fish.
- Sequential numbered order of scale gum cards not followed throughout the season by sampling location and species. For example, scale gum cards and their corresponding data incorrectly numbered 1 at the start of each new sample day.
- Using ink or felt pen, which causes ink to smear when pressing. Use pencil only when filling out front side of scale gum cards.
- More than one date's scales on a single scale gum card. Include one day only per scale gum card.
- Torn, messy, dirty, and wrinkled scale gum cards.
- Rain-soaked and damaged scale gum cards, frequently with the waxed paper inserts stuck to the scale gum card.
- Mounting dirty and damaged scales. Scales incorrectly mounted, such as, inverted or orientated incorrectly.

TABLES AND FIGURES

Table 1.–Yukon River Area salmon sampling location codes.

Yukon					
Location	Stat Code	Location ID	Subdistrict	District ID	Stat Area
Alakanuk	334-12-347	347	3341	334	33412
E.F. Andreafsky R.	334-22-068	68	3342	334	33422
Anvik	334-44-172	1046	3344	334	33444
Anvik River	334-44-172	172	3344	334	33447
Big Eddy	334-10-205	205	3341	334	33414
Big Salmon River	334-70-321	321	3347	334	33470
Bishop Rock	334-46-890	890	3344	334	33440
Blind Creek	334-70-049	49	3347	334	33470
Chandalar R.	334-54-052	52	3345	334	33454
Chena River	334-63-058	58	3346	334	33463
Dall Point	334-11-1048	1048	3341	334	33411
Delta River	334-60-065	65	3346	334	33464
Eagle	334-55-364	364	3345	334	33455
Eagle Sonar	334-55-195	195	3345	334	33455
Emmonak	334-10-359	359	3341	334	33414
Fairbanks	334-63-363	363	3346	334	33462
Fort Yukon	334-55-215	215	3345	334	33455
Galena	334-42-216	216	3344	334	33442
Gisasa River	334-46-080	80	3344	334	33446
Haul Road Bridge	334-53-393	393	3345	334	33453
Henshaw Creek	334-46-084	84	3344	334	33446
Holy Cross	334-32-358	358	3343	334	33432
Huslia	334-46-367	367	3344	334	33446
Julius Creek	334-62-689	689	3346	334	33462
Kaltag	334-46-223	223	3344	334	33446
Kotlik	334-16-1056	1056	3341	334	33416
Lignite Creek	334-62-691	654	3346	334	33462
Marshall	334-24-236	236	3342	334	33424
Middle Mouth	334-15-237	237	3341	334	33415
Mountain Village	334-21-239	239	3342	334	33421
Nenana	334-62-241	241	3346	334	33462
Nulato	334-46-362	362	3344	334	33446
Nulato River	334-46-121	121	3344	334	33446
Pilot Station Sonar	334-23-171	171	3342	334	33423
Pitkas Point	334-22-1054	1054	3342	334	33422
Rampart	334-53-249	249	3345	334	33453
Rampart Rapids	334-52-392	392	3345	334	33452
Rapids Research	334-52-1059	1059	3345	334	33452
Ruby	334-43-217	217	3344	334	33443
Salcha River	334-67-132	132	3346	334	33463
17 mile Slough	334-62-691	691	3346	334	33462
Sheenjek River	334-55-139	139	3345	334	33454
St Marys	334-22-348	348	3342	334	33422
Tanana	334-52-220	220	3345	334	33452
Tanana R. Sonar	334-61-152	152	3346	334	33461
Teslin River	999-70-472	472	3347	334	33470
Toklat River	334-61-158	158	3346	334	33462
White Rock	999-70-411	411	3347	334	33470

Table 2.–Kuskokwim River Area salmon sampling location codes.

Kuskokwim					
Location	Stat Code	Location ID	Subdistrict	District ID	Stat Area
Aniak River	335-00-041	41		335	
Subdistrict W1A	335-12-1041	1041	3351	335	33512
Subdistrict W1B	335-11-1042	1042	3351	335	33511
Bethel	335-00-204	204		335	
Eek	335-00-212	212		335	
George River	335-00-076	76		335	
Goodnews River	335-00-018	18		335	
Kalskag	335-00-382	382		335	
Kalskag Fishwheel	335-00-866	866		335	
Kanektok River	335-00-022	22		335	
Kogrukluk River	335-00-032	32		335	
Kuskokwim District	335-00-006	6		335	
Kuskokwim R. (Lower)	335-00-234	234		335	
Kwethluk	335-00-1124	1124		335	
Kwethluk River	335-00-037	37		335	
Napaimute	335-00-1123	1123		335	
Napakiak	335-00-1053	1053		335	
Oscarville	335-00-1051	1051		335	
Quinhagak	335-00-248	248		335	
Salmon River	335-00-419	419		335	
Takotna River	335-00-148	148		335	
Tatlawiksuk River	335-00-155	155		335	
Telaquana River	335-00-489	489		335	
Tuluksak	335-00-256	256		335	
Tuluksak River	335-00-165	165		335	
Tuntutuliak	335-00-889	889		335	
W1 (Subdistrict 1)	335-10-183	183	3351	335	33510
W4 (Subdistrict 4)	335-40-185	185	3354	335	33540
W5 (Goodnews Bay)	335-50-186	186	3355	335	33550

Table 3.–Arctic Area salmon sampling location codes.

Norton Sound/ Port Clarence/ Kotzebue/ Northern					
Location	Stat Code	Location ID	Subdistrict	District ID	Stat Area
Boston Creek	333-20-196	196	3332	333	33320
Casadepaga River	333-20-713	713	3332	333	33320
Eldorado River	333-10-071	71	3331	333	33310
Eldorado River Tower/Weir	333-10-072	72	3331	333	33310
Glacial Lake Weir	333-10-082	82	3331	333	33310
Golovin Bay Subdistrict	333-20-012	12	3332	333	33320
Inglutalik River	333-40-318	318	3334	333	33340
Kobuk River	333-00-198	198		331	
Kotzebue District	331-01-002	2		331	
Kwiniuk River	333-30-100	100	3333	333	33330
Kwiniuk River Tower	333-30-101	101	3333	333	33330
Moses Point Subdistrict	333-30-013	13	3333	333	33330
Niukluk River Tower	333-20-107	107	3332	333	33320
Noatak River	331-02-108	108		331	
Noatak R. Test Fish Site 3	331-02-244	244		331	
Nome River	333-10-111	111	3331	333	33310
Nome River Weir	333-10-113	113	3331	333	33310
Nome Subdistrict	333-10-011	11	3331	333	33310
North River	333-60-116	116	3336	333	33360
Norton Bay Subdistrict	333-40-014	14	3334	333	33340
Pilgrim River	332-10-128	128	3331	332	33210
Pilgrim River Weir	332-10-130	130	3331	332	33210
Shaktoolik River	333-50-136	136	3335	333	33350
Shaktoolik Subdistrict	333-50-015	15	3335	333	33350
Snake River	333-10-140	140	3331	333	33310
Snake River Tower/Weir	333-10-141	141	3331	333	33310
Unalakleet River	333-60-167	167	3336	333	33360
N.F. Unalakleet R.	333-60-659	659	3336	333	33360
Unalakleet R. Test Fish	333-60-168	168	3336	333	33360
Unalakleet R. Weir	333-60-1026	1026	3336	333	33360
Unalakleet Subdistrict	333-60-016	16	3336	333	33360
Ungalik River	333-40-319	319	3334	333	33340

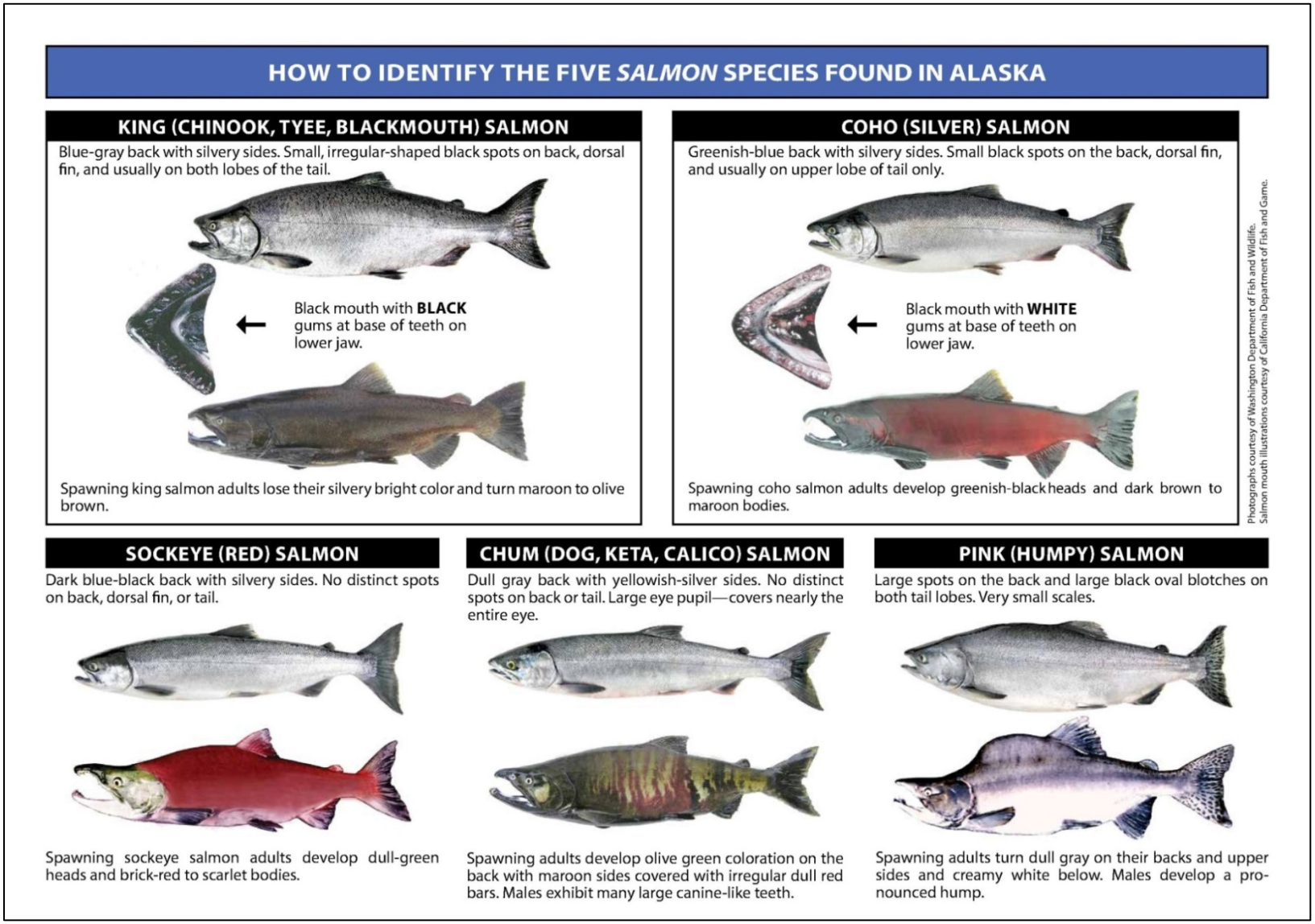


Figure 1.–Identification of salmon species in Alaska.

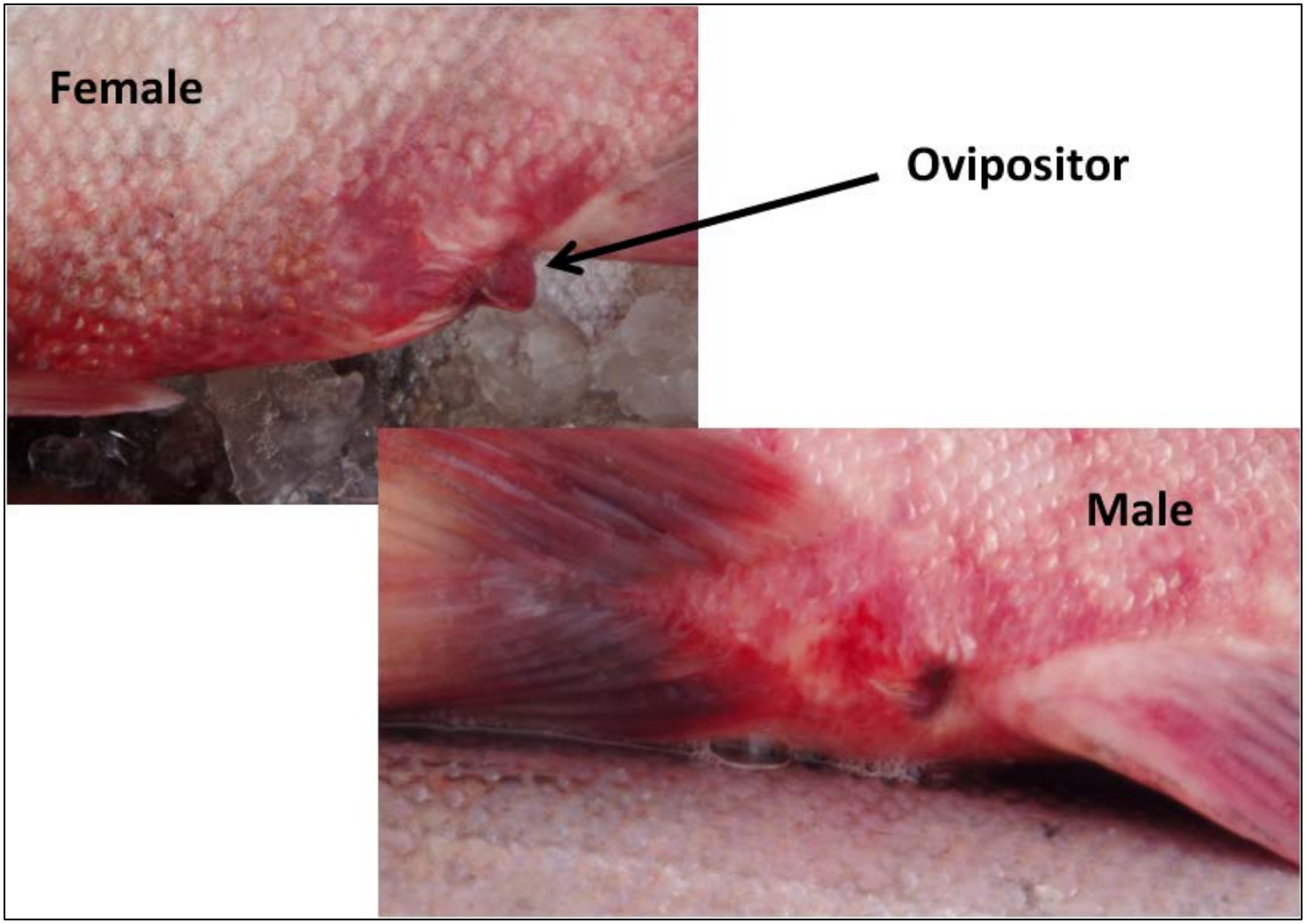


Figure 2.–Pictures of male and female salmon vents showing reproductive organs.

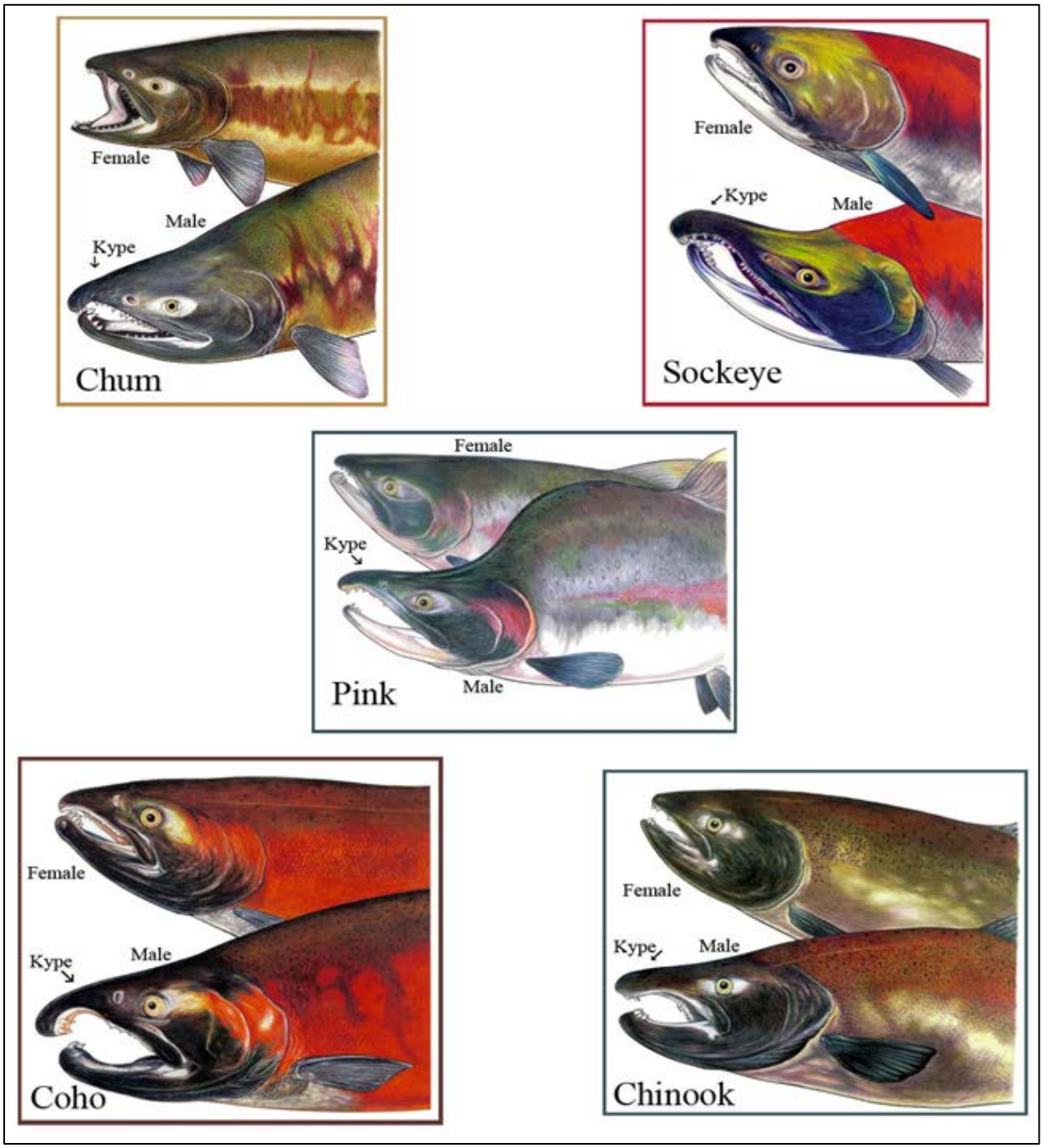


Figure 3.–Illustrations of kype development in salmon.

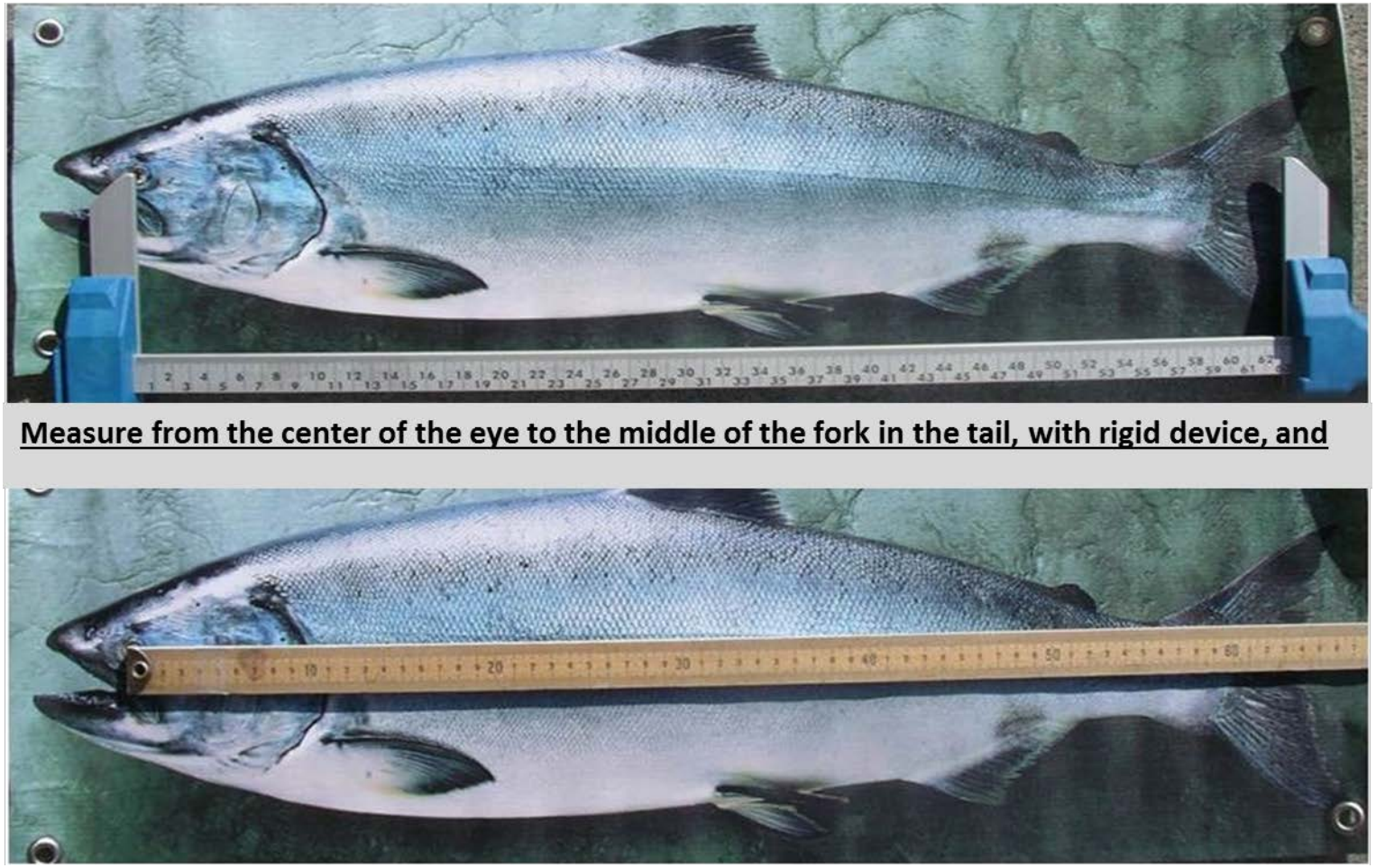


Figure 4.–Salmon measurement from mid-eye to fork of tail using meter stick and caliper.

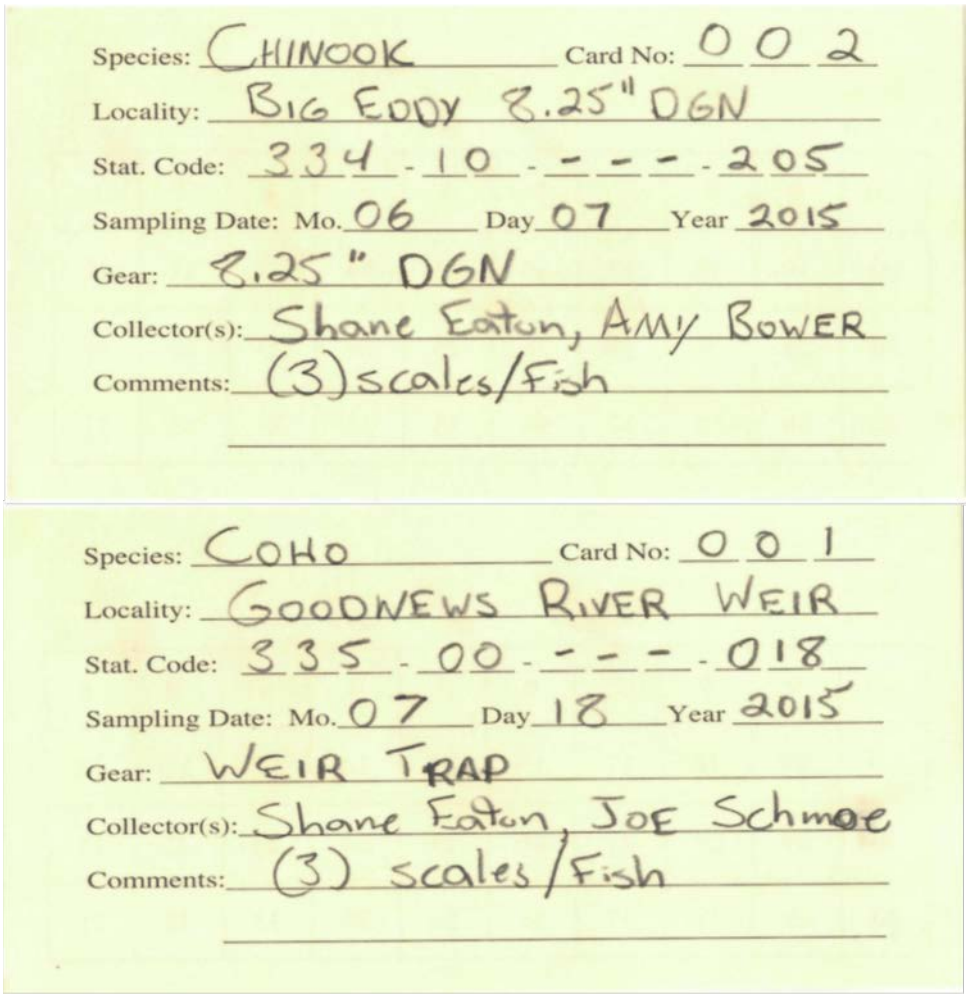


Figure 5.–Properly filled out scale gum cards.

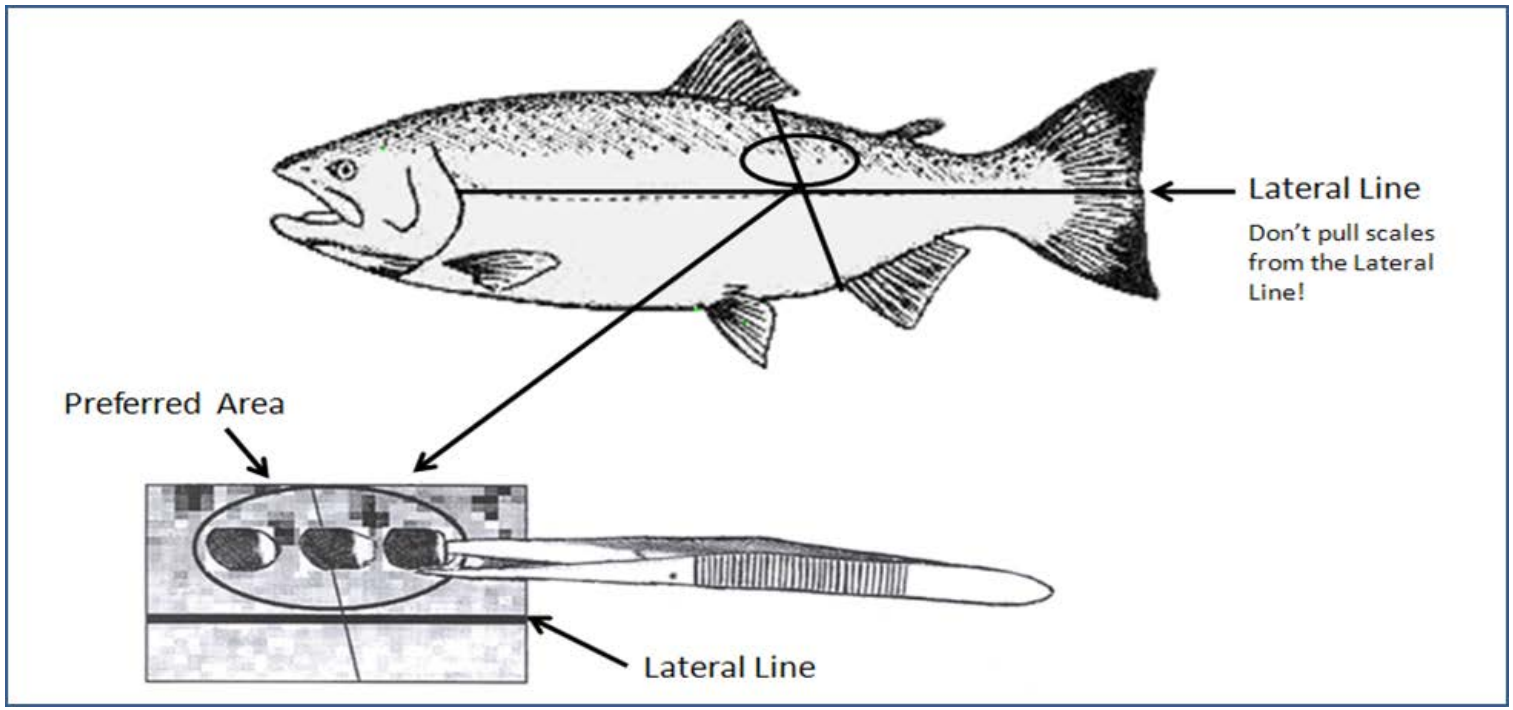


Figure 6.–Illustration of preferred area for collecting salmon scales.

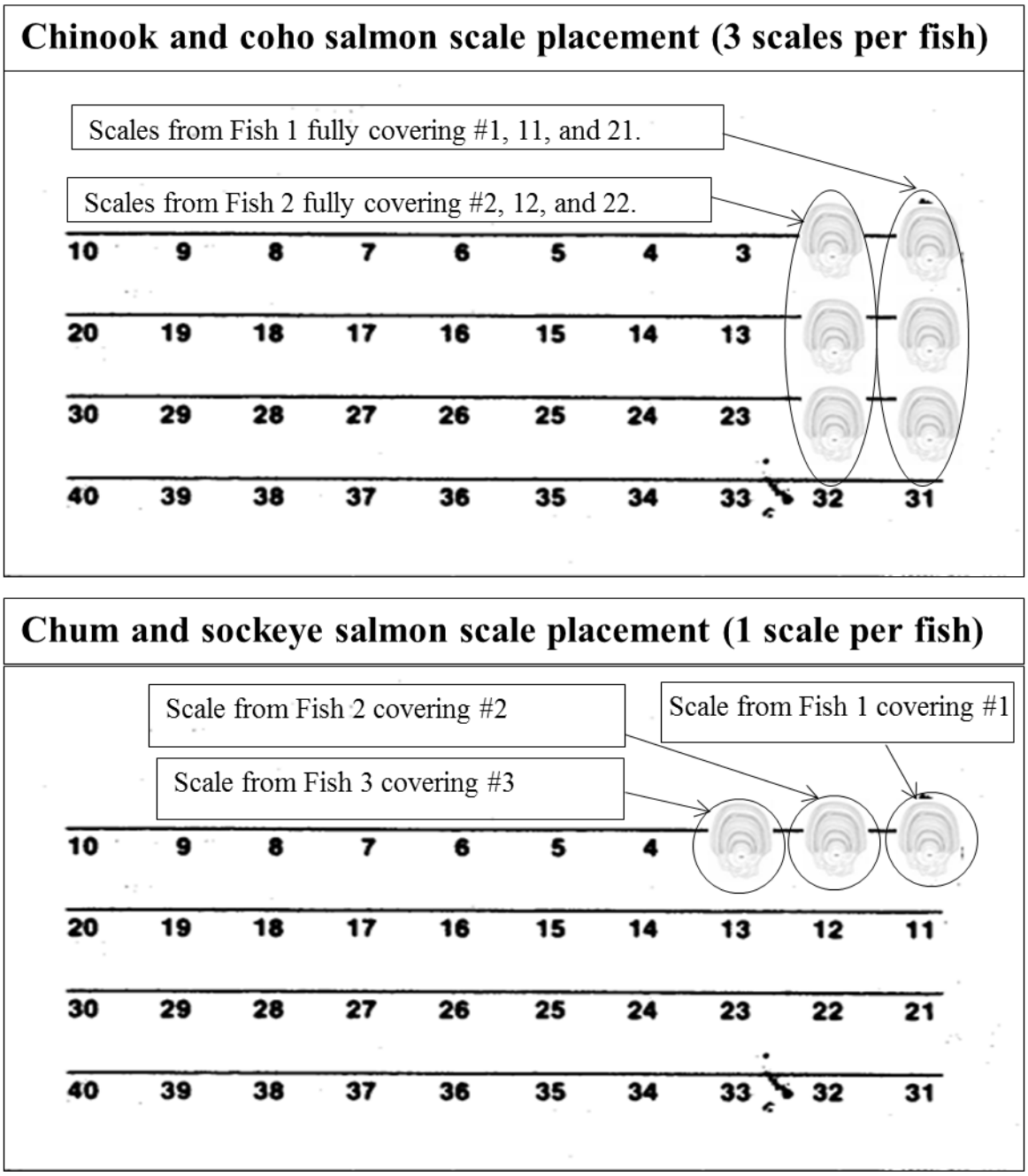


Figure 7.–Illustrations of proper scale placement on scale gum cards.

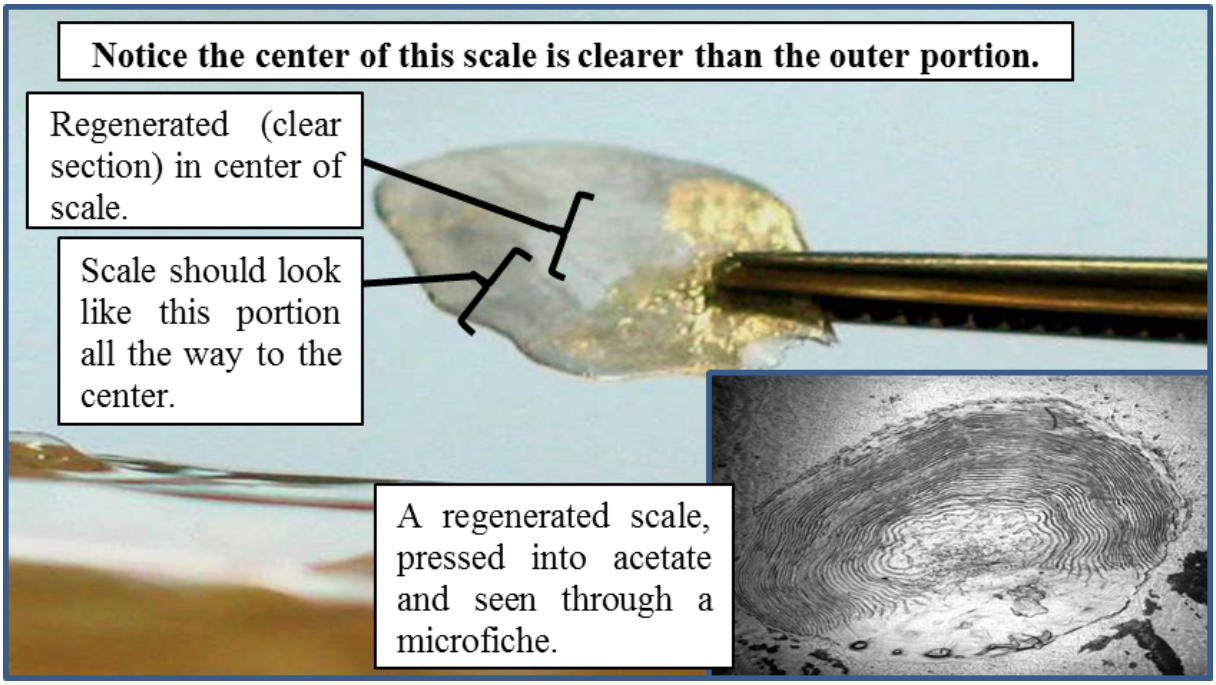


Figure 8.–Picture of regenerated salmon scales.

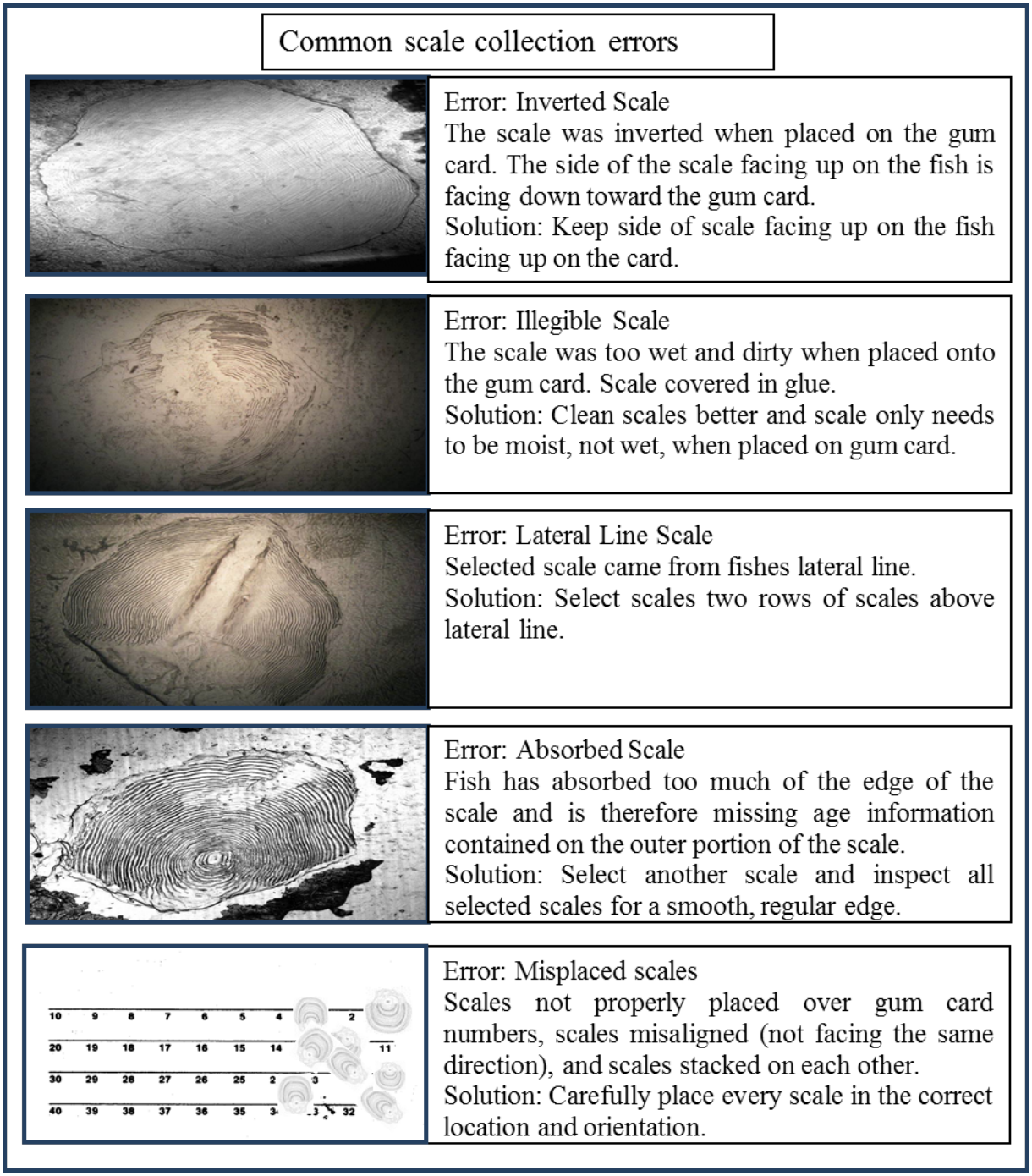


Figure 9.–Common scale selection and mounting errors and suggested solutions.

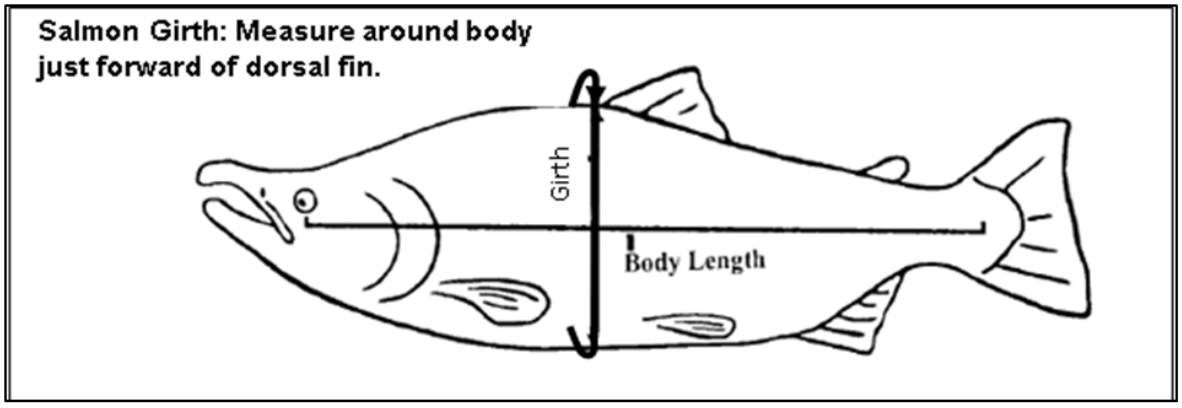
APPENDIX A:
ADDITIONAL SAMPLING PROCEDURES

Appendix A1.–Weight and girth measurement techniques for salmon.

Weight - Weight is collected as soon as feasible after harvesting and transporting fish to the sampling location. Fish are as fresh as possible, not bled, and not desiccated. Fish are relatively clean, without mud, sand, or debris adhering. Fish are weighed by suspending from the scale hook by the operculum (gill cover) and recording the weight to the nearest appropriate unit, e.g. + 0.01 pound. The scale is to be calibrated before the season and checked weekly throughout the season with known standard weights (commonly 15- and 25-lb) and adjusted accordingly if necessary (to + 0.01 lbs). Weight checks and changes made to the adjusting mechanism are noted in the field logbook. The precision of the scale used is recorded. The scale is suspended above solid ground, using a tripod or other arrangement, so when the fish is suspended the tail is not touching the ground. The scale need to be handled carefully during transit and kept out of the weather, either covered or indoors, when not in use. If the scale used to weigh fish displays weight in pounds and ounces, use the conversion table below to record fish weight in decimals to the +0.01 pound.

Ounces	Pounds	Ounces	Pounds
1	0.0625	9	0.5625
2	0.125	10	0.625
3	0.1875	11	0.6875
4	0.25	12	0.75
5	0.3125	13	0.8125
6	0.375	14	0.875
7	0.4375	15	0.9375
8	0.5	16	1.00

Girth - Girth is measured to the nearest millimeter using a flexible tape girthometer, a specialized measuring tape with automatic retraction, or using a flexible fiberglass tape measure. Girth is measured perpendicular to the longitudinal axis of the fish at a point just anterior and abutting the dorsal fin. The measuring device is wrapped taut around the fish and fully contacts the fish but is not tightened to the point of compressing the fish.



Appendix A2.–Instructions for collecting coded wire tag data from salmon.

ALASKA DEPARTMENT OF FISH AND GAME
CODED WIRE TAG SAMPLING PROGRAM
DETAILED SAMPLING INSTRUCTIONS
PERSONAL USE, SPORT AND SUBSISTENCE FISHERIES SAMPLING

2014
CENTRAL, WESTWARD, AND AYK REGIONS

Introduction

Coded wire tags (CWT) recovered from properly designed and conducted studies can provide scientists, fishery managers and hatchery operators with data for evaluating and managing salmon stocks. The use of this stock identification tool has been in use in Alaska since the 1970's. Scientists and managers use this tool to evaluate both naturally spawning and enhanced stocks of fish.

The Tag Lab will send an email or a letter to each individual sport fishers to inform them of the origin of each adipose clipped fish if a valid email is provided or their name and address are completely and legibly filled out on the sampling form.

General Instructions

All species of salmon and steelhead have been coded wire tagged in various areas of the state. However since 2010, only coho and Chinook salmon have been tagged in Alaska. The species you check for CWT's (externally identified by a missing adipose fin) are dependent on location and your project's goals, objectives, and sampling design. **Individual project objectives, sampling design criteria and specific instructions for how, when, and where you conduct your sampling will be provided by the project leader or your supervisor.** When an adipose clipped fish is observed, the fish should be measured, a CWT Sampling Form completed, a uniquely numbered cinch strap inserted through the mouth and out the operculum, and the head collected. Heads from any adipose clipped salmon or steelhead may be voluntarily turned in to you by an angler. A sampling form must also be filled out as completely as possible for these fish.

A sampling form must be filled out as completely as possible if an angler comes in with a trophy size fish and does not want to surrender the head. It is especially important to record the angler's name and address in this case. Record the name of the taxidermist who will be mounting the fish if the angler knows. Stress the importance of finally getting the head. Try to get the head from the taxidermist. Note on the sampling form that the head was not surrendered to you and send the sampling form to the Tag Lab along with other sampling forms and heads collected.

A sampling form must be completed for every adipose clipped fish you observe during random sampling, regardless of whether the head was recovered. You must still complete a sampling form if you find that a head has been removed from an adipose clipped fish and discarded by the angler. Assign that adipose clipped fish the HEAD NUMBER on your next cinch strap. Attach the cinch strap to the sampling form. Indicate on the sampling form that the head was removed and discarded by the angler.

Heads must be placed in individual bags provided by the Tag Lab and kept frozen until sent to the Tag Lab in Juneau. Sampling forms must be included with each shipment **HEADS RECEIVED**

-continued-

WITHOUT DATA WILL NOT BE PROCESSED. Heads should be sent to the Tag Lab periodically during the season, as often as once a week.

Specific Instructions

Note: Specific data items listed on the CWT Sampling Form are identified in these instructions by the use of all capital letters. The sampling form and the specific instructions are divided into five major sections: Interviewer Information; Stratification Information - Random, Sport Samples Only; Angler Information; Catch Information; Sampling Information and Head Recovery Information. These instructions follow the sampling form (Figure 1) from top to bottom and from left to right.

Only a single value for each requested data item is allowed. (Exception: NAME OF PLACE FISHED and DISTRICT(S) - SUBDISTRICT(S) where multiple values are accepted.) One sampling form can include all heads recovered from a single location, stream, and day if information specific to a single angler is irrelevant. One sample can be made up of multiple pages if more than ten heads are recovered from a single location, stream, and day.

INTERVIEWER INFORMATION

SAMPLE NUMBER: This number identifies each unique sampling form in the CWT database. The supervisor has been given a sample number series to assign. Please contact the Tag Lab if you do not know what sample number series to assign.

PAGE____OF____PAGES: use additional pages if more than 10 heads are recovered per sampling location, day and district. Page numbers are specific to each individual sample; e.g., a sample with 17 heads will have page 2 of 2 with the same sample number assigned to both sheets.

SOURCE: circle one:

personal use - Specific fisheries may be open by the Board of Fisheries and the Department by regulation or, more commonly, by emergency order that allow resident sport anglers to take salmon by means other than by hook and line in a specific area and time. Participation in these fisheries requires a resident sport fishing license and a permit issued by the Department's Commercial Fisheries Division; occasionally a personal use fishery requires only a sport fishing license. These fisheries are often opened to harvest excess hatchery returns.

sport - Traditional fisheries are open to all anglers who have a sport fishing license. Sport fishing may only be conducted by use of hook and line unless otherwise provided by regulation. Open areas and seasons and bag, possession and size limits are regulated by the Board of Fisheries and the Department's Sport Fisheries Division.

subsistence - The non-commercial, customary and traditional uses of wild, renewable resources by a resident of Alaska for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of non-edible by-products of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption. **Subsistence fishing** is further defined as the taking of, fishing for, or possession of fish, shellfish, or other fisheries resources by a resident of the state for subsistence uses with gillnet, seine, fish wheel, longline, or other means defined by the Board of Fisheries. Participation in these fisheries requires a permit issued by the Department's Commercial Fisheries Division.

SURVEY SITE: community near where you are sampling (e.g., Anchorage, Cordova, Homer, Palmer, Soldotna, Valdez, Seward, etc.).

-continued-

SAMPLE TYPE: circle one:

random - adipose clipped fish observed during creel surveys.

select - adipose clipped fish from a community or area having a creel survey but not recovered in a random sampling process; these fish are often brought to the sampler.

Voluntary (for sport recoveries only) - adipose clipped fish from a community or area or time period which isn't covered by a random creel survey program.

SAMPLER: your last name

NAME OF PLACE SAMPLED: needed for random samples only. Record fishery access location you are sampling (e.g., Ninilchik River, Homer Spit Lagoon, Burma Road access, mouth of Willow Creek, Houston boat launch, Seward small boat harbor, etc.).

DATE SAMPLED: Random samples - date fish are sampled by you
Select or Voluntary samples - date fish were caught

STRATIFICATION INFORMATION - RANDOM, SPORT SAMPLES ONLY

Complete this section for every adipose clipped fish observed (whether or not you are able to recover the head) during random sampling programs.

SPORT HARVEST CODE: **For Random samples only; Do not record if sample is select or voluntary.** If random, record the appropriate code from the fishery you are sampling by transferring the two letter code to the appropriate box. Note: the alpha code is derived from the underlined, highlighted letters of the appropriate SPORT HARVEST CODE.

Derby **E**ntered	- fish entered in a derby
Derby **T**akehome	- fish caught in a derby, not entered but instead taken home
Freshwater **F**ishery	- fish caught in freshwater
Marine **B**oat	- fish caught from a boat that fished in the ocean
Marine **R**oadside	- fish caught in ocean by angler on shore
Terminal **F**ishery	- marine fisheries opened or bag/possession limits changed in terminal areas designed to harvest hatchery returns (used in Southeast)

ANGLER INFORMATION

ANGLER'S NAME: name of the angler who caught fish. If more than one angler fishing from a single sampled boat caught an adipose clipped fish, you will need to complete a separate sampling form for each individual with their fish. This, along with legible printing, ensures that each angler will receive a letter. Only provide this information for sport fishing not subsistence fishing.

MAILING ADDRESS: email or mailed letters informing each angler when and where their tagged fish was released will be processed and mailed a few days after the tag is read. If we do not have a complete mailing address, including zip code or a current email address, a letter will not be generated and mailed. Only provide this information for sport fishermen because subsistence and personal use fishermen are not eligible for sport letters.

-continued-

CATCH INFORMATION

DATE CAUGHT: the day adipose clipped fish were caught. Fish caught on different days must be listed on separate sampling forms.

WATER TYPE: Was angler fishing in saltwater, or in freshwater? Circle one:
saltwater
freshwater

NAME OF PLACE FISHED: record specific location where the angler was fishing. This item is especially important if DISTRICT-SUBDISTRICT and/or ANADROMOUS STREAM # are not known.

AREA INFORMATION (DISTRICT(S)-SUBDISTRICT(S)): for saltwater angling, record the current and valid commercial fishing district(s) and subdistricts(s) where angler was fishing. Refer to attached LIST OF COMMON "PLACES FISHED." For freshwater angling, record the current valid commercial district and subdistrict that **includes** the ANADROMOUS STREAM # (see attached list). (e.g., Fleming Spit is 221-10, Homer Spit Lagoon is 241-13, Chiniak Bay is 259-21, etc).
ANADROMOUS STREAM # (freshwater-only): if this fish was caught in freshwater, please enter the Anadromous Stream Catalog number listed in the latest edition of the "Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes" published by the Department's Sport Fish Division. This will be at least a ten digit number but could have as many as thirty-eight digits. Please call your local Sport Fish Division office or the Tag Lab for assistance if the catalog is unavailable. Be as descriptive as possible when you record the NAME OF PLACE FISHED. See attached list of possible ANADROMOUS STREAM #s.

SAMPLING INFORMATION

Please record the counts on all pages of each sampling form for samples with multiple sheets.

TOTAL # FISH CHECKED FOR AD-CLIPS: you must first choose fish to inspect, then look to see if the adipose fin is absent, count and record each fish, by species/species code you choose to inspect. Included in that count will be both unclipped and adipose clipped fish. **Count only those fish you are sure either have or do not have an adipose fin. If you did not get a good look at the fin do not count that fish.** Remember, this sampling form is only for recording CWT sampling information. The number of fish observed for another project should not be recorded here.

 # ADIPOSE CLIPS SEEN: record by species/species code the number of fish checked that are missing adipose fins. A sampling form must be completed even if no marked fish were observed in the sampled landing. "Zero" for # ADIPOSE CLIPS SEEN is a valid and meaningful observation. A form is not required if no fish were caught by the angler.

WERE ALL CHECKED?: circle **y**es or **n**o (for each species/species code checked). It is vital that you count only those fish you are sure have or do not have an adipose fin. If you circle yes then you are stating that you observed every single fish of that species landed.

-continued-

HEAD RECOVERY INFORMATION

☑ **CHECK BOX**: this box will be used by the person in charge of head and data shipment at each survey site to check off heads as they are being boxed for shipment to the Tag Lab.

HEAD NUMBER: record the six digit* number of the cinch strap you attach to the head of each adipose clipped fish. Be sure that the HEAD NUMBER is readable after you insert the cinch strap through the mouth and out the operculum but before you cinch it up. Cinch straps are in numerical order, use them in this order. If you find that a head has been removed from an adipose clipped fish and discarded by the angler, you must complete a sampling form anyway. Assign that discarded or lost head the HEAD NUMBER on your next cinch strap. Attach the cinch strap to the sampling form. Indicate on the sampling form that the head was removed and discarded by the angler.

***Note: If you are using a cinch with only five digits or numbers simply insert a leading zero for the first digit.**

SPECIES CODE: Record the species code of each adipose clipped fish.

- **410 = CHIN** - chinook or king salmon
- **411 = JACK** - immature or small king or chinook salmon only; (DO NOT USE UNLESS SUPERVISOR INSTRUCTS YOU OTHERWISE)
- **420 = SOCK** - sockeye or red salmon
- **430 = COHO** - coho or silver salmon
- **440 = PINK** - pink or humpback salmon
- **450 = CHUM** - chum or dog salmon
- **540 = STHD** - steelhead trout

LENGTH: measure the fish from the mid-eye to fork-of-tail in millimeters (see Figure 2). If an angler gives you a head from an adipose clipped fish and gives you a measurement, ask them what type of measurement was made. An angler will measure the total length of the fish in most cases. Note the type of non-standard measurement taken on the sampling form.

CLIP STATUS: circle one. Note the quality of the adipose clip using the following codes:

Good - the clip looks like a clean cut with a well healed scar.

??? (Questionable) - poor quality adipose clips could be the result of bad fin clipping or some natural cause of mutilation. **Recover head regardless of the quality of the adipose fin clip.**

Unkn (unknown) - if you only see the head and therefore are unable to assess the quality of the fin clip yourself.

CHINOOK FLESH COLOR: (for chinook salmon only). Circle one: **red** or **white**

COMMENTS: record any comments you may have about the sample or its irregularities on the back of the sampling form and please indicate that we should "see back of the sampling form."

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Head Shipment Instructions

1. Heads should be shipped to the Tag Lab periodically during the season, as often as once a week.

2. Heads must be placed in an individual plastic bag, provided by the Tag Lab. Heads must be frozen (or if a freezer is not available, preserved in borax or salt). Place individually bagged heads in large garbage bags inside a box (waxed or "wet lock" boxes are not required if heads are double bagged).

3. Place all **original** sampling forms in a single plastic bag and place bag in the box with the heads.

4. The person in charge of shipping heads to the Tag Lab will complete the HEAD SHIPMENT SUMMARY FORM and include it with the head shipment. Instructions for completion of that form will be sent to the person in charge of each survey site. Check off heads on sampling form as they are being boxed for shipment in order to ensure that all heads are sent to Juneau. If heads or data are missing, find them.

5. Use the 'CWT Head Shipment' labels to number the boxes so we can be sure the air carrier gives us the complete shipment.

6. Put the data in one box and circle YES Data Enclosed? on the corresponding box label.

7. Attach **KEEP FROZEN/ADDRESS** labels to one or two sides of your boxes.

8. If you live in a community served by Alaska Airlines, send heads and data directly to the Tag Lab on that carrier. If you live in a community not served directly by Alaska Airlines, send shipments to Juneau on a regularly scheduled commuter flight that transfers to Alaska Airlines or provides service directly to Juneau.

9. Please email Detlef Buettner detlef.buettner@alaska.gov or call our front desk at (907) 465-3483 with the airway bill number (if available) and estimated time of arrival of the heads.

10. Use shipping labels provided. Send heads **PREPAID** (see exception in #11) to:

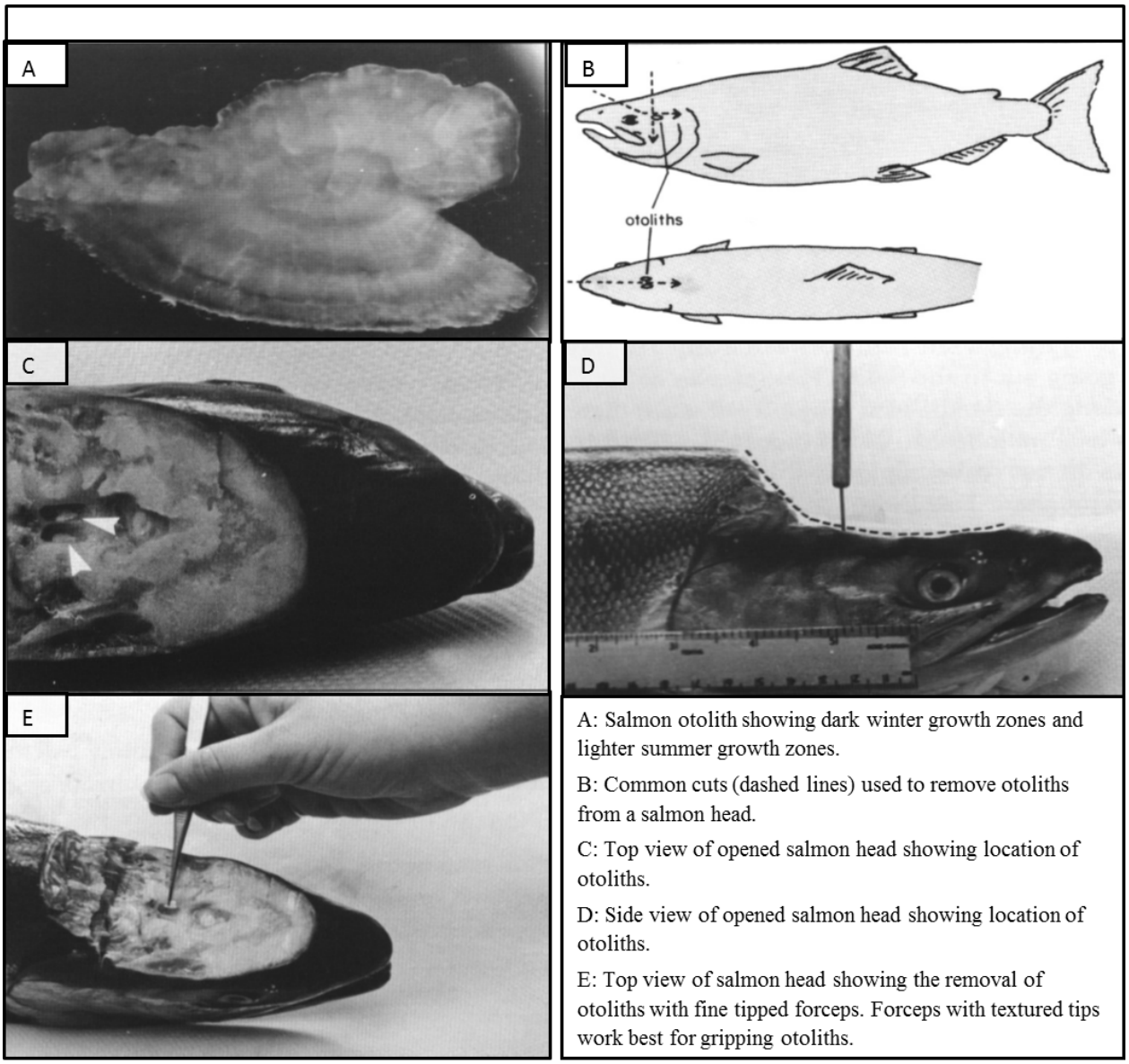
    Alaska Department of Fish and Game
    CF Division, Mark, Tag, and Age Lab
    P.O. Box 25526
    Juneau, Alaska 99802-5526

    CALL UPON ARRIVAL IN JUNEAU
    (907) 465-3483

11. Cook Inlet Sport/Escapement heads should be sent to the Tag Lab **FREIGHT COLLECT**. All other projects should send heads to us Prepaid.

12. **HEADS SHIPPED WITHOUT DATA WILL NOT BE PROCESSED.**

Appendix A3.–Illustrations of salmon otolith removal.



A: Salmon otolith showing dark winter growth zones and lighter summer growth zones.

B: Common cuts (dashed lines) used to remove otoliths from a salmon head.

C: Top view of opened salmon head showing location of otoliths.

D: Side view of opened salmon head showing location of otoliths.

E: Top view of salmon head showing the removal of otoliths with fine tipped forceps. Forceps with textured tips work best for gripping otoliths.

Appendix A4.–Addresses of stock biology staff in the Arctic-Yukon-Kuskokwim Region.

Anchorage Office

Region 3 Stock Biology Staff
Alaska Department of Fish and Game
333 Raspberry Rd
Anchorage Alaska 99518

Nome Office

Arctic Area Stock Biology Staff
Alaska Department of Fish and Game
PO Box 1148
Nome, AK 99762

Emmonak Office

Yukon Area Stock Biology Staff
Alaska Department of Fish and Game
PO Box 127
Emmonak, AK 99581

Bethel Office

Kuskokwim Area Stock Biology Staff
Alaska Department of Fish and Game
PO Box 1148
Nome, AK 99762

Appendix A5.–Preparing the ASL data entry field file with project specific information.

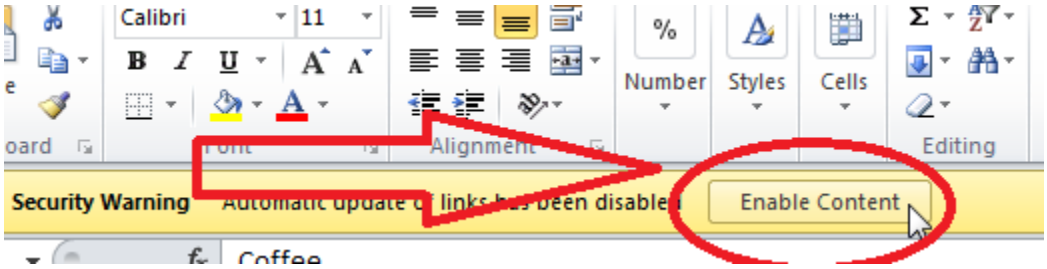
This new field file format was developed to streamline field crew data entry by eliminating unnecessary data columns and has data validation built in to eliminate some common data entry errors.

Instructions:

Preparing Field Files

A new ASL field file is prepared for each ASL sampling project each year. AYK stock biology staff will be familiar with the preparation of these files to help each field crew record accurate data quickly and easily.

1. Open the Field File Template and enable content to allow macros to run.



2. The new “smart” field file template is set up to automatically open with the ‘Project Level’ sheet open in cell “B2”. In this section (top left box) one will find drop down lists to select the “Area”, “Project Type”, “Length Measurement Type”, “Aging Structure”, and “Sexing Method”. These fields are usually consistent within a project even if multiple species or gear types sampled. Using the drop down lists, select values for each field appropriate to the project. Cells turn white when data is entered; red cells mean data is missing.
3. To the right of the Project Level Data area, enter the name of the project into the text box where the template says “Project X” followed by the year.
4. Next, start filling out the “Data Entry Sheet” sections. These correspond to each of the following 6 worksheets (Labeled A through F). These sections separate unique combinations of species and gear types. For example; “Data Entry Sheet A” may be used for Chinook salmon caught using drift gillnets, while “Data entry sheet B” may be used for Chinook salmon caught using set gillnets even if the location is the same. The workbook is designed to rename each worksheet to correspond with the combination of location and species sampled when the workbook is closed and reopened.
5. After selecting all attributes of the project in the Data entry sheet sections, save the file with the correct naming convention and reopen. If the data entry tabs have not been renamed, this means the macro has encountered an issue (usually two sheet being named the same) and sheets will have to be named manually.
6. Select and delete unused data entry sheets, and delete the corresponding cells on the "project level" sheet.

-continued-

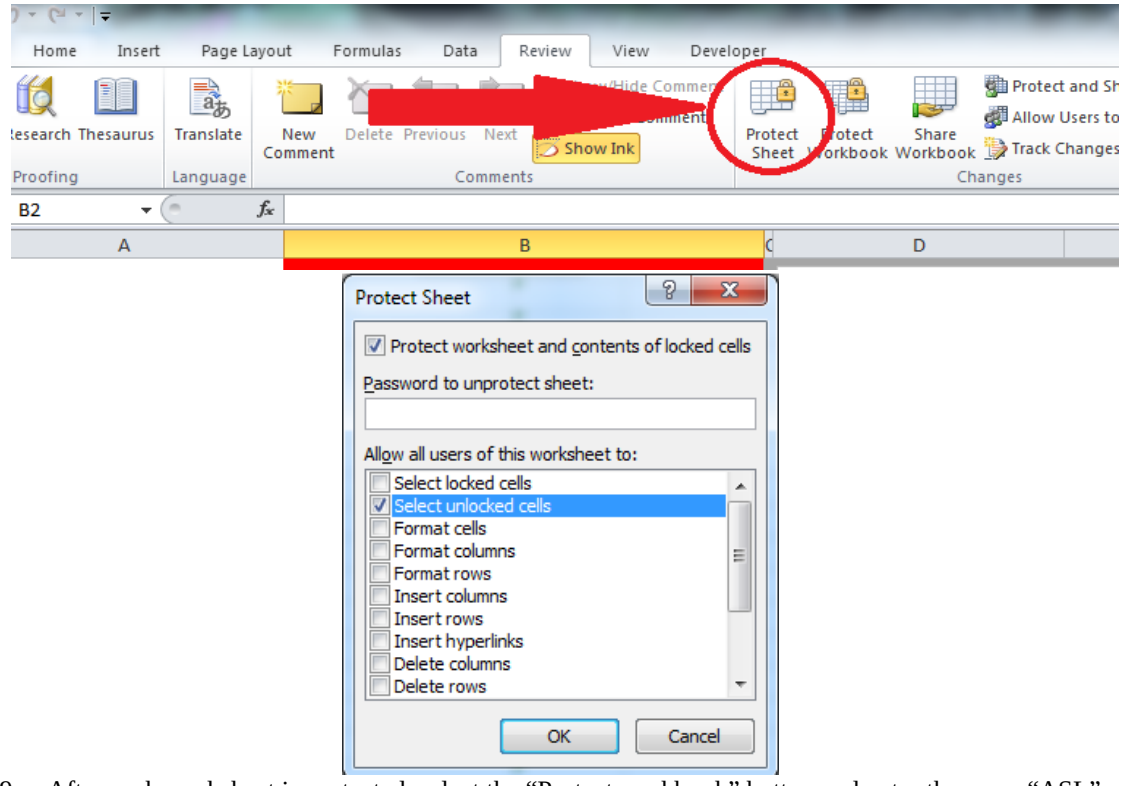
7. Inspect each data entry worksheet and hide all columns with an orange header (others will be colored green). These columns are used by the inseason database for data values that repeat for every fish sampled (e.g. run id, measurement type, species, etc.). Hiding those limits field crew ability to enter erroneous data and streamlines data entry. While hiding columns review the types of data collected by the project and ensure only columns required are left visible.

   Special Considerations;

   i. For subsistence projects, data collected from multiple locations on the same data entry sheet. This will require hard entry of the location of each fish (location column header will remain green when project type is set to subsistence) and one will have to clear the autofill formulas out of the location column.

   ii. For projects using multiple mesh sizes (i.e. Pilot Station Sonar, Eagle Sonar, Bethel Test Fishery) leave the mesh size blank on the "Project Level Data" worksheet. Mesh size will be hard entered in the "Data Entry Sheet" for each fish sampled. The "Mesh Size" column header on the data entry sheet will remain green and you will need to clear the formulas from the mesh size column for these projects.

8. After the field file is completed, go through and select each worksheet and protect the worksheet by clicking the "Protect sheet" button.
   A popup window will appear, ensure the password is set to "ASL" (all capital letters) and the only check box selected should be "Select unlocked cells"



9. After each worksheet is protected, select the "Protect workbook" button and enter the same "ASL" password.
10. Save the file in the appropriate location and with the appropriate naming convention (i.e. "Location_Project Type_Field_File_Year").
11. Send the file to the appropriate project leader. This completes the Field file set up.